Economic Optimization and Technical Efficiency in Russian Enterprises Jointly Regulated by Profits and State Incentives

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Western analysts have seriously misforecast Russia's economic transition. They believed that privatized post-Soviet firms operating in a liberal environment would quickly prosper by becoming responsive to market demand, and economizing costs as required by the logic of profit maximization. Little attention was paid to the institutional setting on the tacit assumption that market forces would bring about the requisite adaptations.

This paper attempts to assess why the efficiency of the self regulating economic system emerging in Russia hasn't yet risen to the western capitalist norm by examining contemporary Russian institutional arrangements in Soviet perspective. It will be shown that while the incentives and constraints which conditioned Soviet enterprise bonus maximization have changed, the warped logic and culture of administrative optimization elaborated nearly a decade ago in Steven Rosefielde and R.W. Pfouts, "Economic Optimization and Technical Efficiency in Soviet Enterprises Jointly Regulated by Plans and Incentives," European Economic Review, Vol. 32, No. 6, 1988, pp. 1285-1299, remains intact.

1. The Soviet Directive System

Firms in the Soviet Union were internally and externally governed by an array of controls commonly described as the command mechanism. From an internal perspective enterprises were state owned, with appointed managers required to carry out assigned tasks and goals according to externally imposed directives, rules, constraints and scarcity indicators (price fixing). In principle this involved an array of actions of varying complexity, from elementary procedures like stapling papers to creative endeavors like designing machine tools, with primary emphasis placed on the mechanical implementation of simple plan, micro-directives. Since all administrative procedures were considered in some degree to be part of a central planning process, the concepts of command and plan were routinely viewed as interchangeable. But this was misleading. Command in Soviet firms was more about fulfilling targets requiring complicated managerial problem solving than reflexive implementation of tekhpromfinplan (enterprise microplans). The command economy in practice therefore was fundamentally a system of administratively controlled production tasking, achieved through constrained enterprise bonus maximizing that dispensed with consumer sovereignty and private enterpreneurship in order to mobilize

resources and promote rapid economic growth, while preserving price stability and a relatively level distribution of income.

2. The Soviet Firm

Soviet firms played a vital and special role in this process because their performance largely determined the productivity of the entire economic system. Unlike other elements of the control apparatus, they couldn't just process paper, pretending that their work was valuable. They had to produce tangible things of some palpable worth. This was accomplished by adopting the principle of khozraschyot, economic cost accounting, which rewarded enterprises for economizing resources, and producing high value added goods evaluated at official ruble prices. Khozraschyot was like other aspects of the directive mechanism insofar as it provided rewards for fulfilling specified tasks, but it was also different serving as a bridge between the dissimilar logics of bureacratic administration and markets. Administrators usually are preoccupied with procedures and the completion of tasks, whereas managers under khozraschyot had to concern themselves with optimization problems such as the determination of the best use of resources to achieve their goals. Efficiency, was the watchword of managers, but was only a secondary admininstrative consideration.

Western theorists for the most part doubted that khozraschyot could serve this purpose, mitigating the pervasive inefficiency of the Soviet directive apparatus. They were right in asserting that khozraschyot could only simulate and not replicate competitive, consumer demand driven market outcomes. But Rosefielde and Pfouts demonstrated that khozraschyot could generate a second best; that is, outcomes which were technically efficient, economizing resources, and optimizing product assortments on the nominal scarcity relationships implied by official prices, subject to various quantitative constraints.

The likelihood that technical efficiency could really be achieved under these arrangements turned on whether enterprises guided by potentially contradictory plan-directives, rules, signals, and incentives could be induced to meaningfully satisfy Kuhn-Tucker optimality conditions with prevailing bonus incentive mechanisms. If plan directives precluded such outcomes, Soviet enterprises were likely to be technically inefficient. If not, conventional parametric optimization techniques could suffice to make Soviet firms technically efficient.

3. Kuhn-Tucker Conditions

It is relatively easy to demonstrate that Soviet enterprises can satisfy Kuhn-Tucker requirements for a variety of widely used reward functions, once it is recognized that plan-directives, rules, signals and incentives do not constitute contradictory sets of instructions, but are part of a unified joint optimizing mechanism in which plan-directives establish benchmarks for setting reward schedules and monitoring performance; and

rules, signals and incentives determine managerial behavior when plan-directives are infeasible, or can be legitimately overfulfilled. Three such cases are especially interesting because of the place they hold in the evolution of Soviet managerial practice: output maximization, revenue maximization and profit maximization.

Consider first the case of the single product firm in which imposed or negotiated bonuses are based on output; where production is subject to a special set of imposed or negotiated budgetary constraints on quota inputs in deficit supply; and non-quota inputs are purchased with borrowed funds and revenues generated from the sale of outputs. Assume further that production and factor prices are fixed; that the production expressed in conventional notation is strictly concave

$$(1)\, x \,=\, f\left(v_1,\; v_2,\; ...,\; v_n\right),$$

and that the quota input constraints take the form

$$(2)\, w_i\; v_i \,-\, m_i \;\leq\; 0, \quad \forall_{i=1}^k,\, k < n,$$

where m_i is the total amount the firm is permitted to spend on factor i and w_i is the price of factor i.

In addition there is an overall budget constraint equal to the receipts from sales by the firm in the last operating period plus a limited amount of credit which shows that the total expenditure on resources must not exceed the amount of money available to the firm. This sum minus fixed costs F is denoted by M, and the constraint takes the form

$$\sum_{j=1}^{n} w_j\; v_j \,-\, M \leq\; 0.$$

4. Output Maximization

The Lagrangian for the output maximization case can be written as

$$L \,=\, f\left(v_1,\; ...,\; v_n\right) \,-\, \sum_{i=1}^{k} \lambda_i \left(w_i\; v_i \,-\, m_i\right) \,-\, \Psi \left(\sum_{j=1}^{n} w_j\; v_j \,-\, M\right).$$

The Kuhn-Tucker conditions (Kuhn-Tucker, 1951) are

$$(3) \qquad \frac{\partial L}{\partial v_i} \;=\; \frac{\partial f}{\partial v_i} \,-\, \lambda_i\; w_i \,-\, \Psi\; w_i \;\leq\; 0, \quad \forall_{i=1}^k,$$

$$(4)\frac{\partial L}{\partial v_j} = \frac{\partial f}{\partial v_j} - \Psi w_j \leq 0, \quad k < j \leq n,$$

$$(5)\frac{\partial L}{\partial \lambda_i} = m_i - w_i v_i \geq 0, \quad \forall_{i=1}^k,$$

$$(6)\frac{\partial L}{\partial \Psi} = M - \sum_{j=1}^n w_j v_j \geq 0, \quad \forall_{j=1}^n.$$

Associated with (3) are the equations

$$(3a) v_i \left(\frac{\partial f}{\partial v_i} - \lambda_i w_i - \Psi w_i \right) = 0, \quad \forall_{i=1}^k,$$

which, together with (3) show that a quota factor will not be used unless its marginal physical product is equal to the product of the shadow price of a relaxation of m_i, and/or the shadow price of a relaxation of M multiplied by the price of the quota factor, whichever restriction is more stringent, when they do not both hold simultaneously[1].

Similarly, associated with (4) we have

$$(4a) v_j \left(\frac{\partial f}{\partial v_j} - \Psi w_j \right) = 0, \quad k < j \leq n,$$

which shows that a non-quota factor will not be used unless its marginal physical product is equal to the product of the factor price and the shadow price of a relaxation of M. Again the budget constraint may be non-binding. In this event the marginal physical product of the non-quota factor must be zero[2].

Finally associated with (5) and (6) we have

$$\lambda_i \left(w_i v_i - m_i \right) = 0, \quad \forall_{i=1}^k$$

and

$$\Psi \left(M - \sum_{j=1}^n w_j v_j \right) = 0,$$

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[1] Quota input v_i may be used more, less or equally intensely as the Pareto efficient competitive rate.

[2] If the budget constraint is non-binding v_j must be overutilized by the Paretian standard.

both of which have the interpretation that the dual variable will be zero if the accompanying constraint is ineffective.

Clearly (3) and (4) permit Soviet enterprises to be potentially technically and economically efficient even though as explained in Section II the conditions for optimization differ from the corresponding conditions in the case of a price taking, profit maximizing firm with no input restrictions.

If revenue maximization is the goal given to the firm manager, the result is the same as in the case of output maximization. This, perhaps, is obvious since the Lagrangians in the two cases differ only by a constant factor, the product price. As a consequence revenue maximization will not be discussed further.

5. Profit Maximization

We now assume that profit maximization, subject to the same constraints on certain factor inputs, is the reward specification that the firm should follow: The Lagrangian is

$$\hat{L} = px - \sum_{r=1}^{n} w_r \ v_r - \sum_{i=1}^{k} \hat{\lambda}_i \left(w_i \ v_i - m_i \right) - \hat{\Psi} \left(\sum_{r=1}^{n} w_r \ v_r - M \right),$$

and the Kuhn–Tucker conditions are

$$(7)\frac{\partial \hat{L}}{\partial v_i} = p \ \frac{\partial x}{\partial v_i} - w_i - \hat{\lambda}_i \ w_i - \hat{\Psi} \ w_i \leq 0, \quad \forall_{i=1}^{k},$$

$$(8)\frac{\partial \hat{L}}{\partial v_j} = p \ \frac{\partial x}{\partial v_j} - w_j - \hat{\Psi} \ w_j \leq 0, \quad k < j \leq n,$$

$$(9)\frac{\partial \hat{L}}{\partial \hat{\lambda}_i} = m_i - w_i \ v_i \geq 0, \quad \forall_{i=1}^{k},$$

$$(10)\frac{\partial \hat{L}}{\partial \hat{\Psi}} = M - \sum_{r=1}^{n} m_r \ v_r \geq 0, \quad \forall_{r=1}^{n}.$$

Assuming that factor i is used (7) allows us to write:

$$(7a) p \ \frac{\partial x}{\partial v_i} = \left(1 + \hat{\lambda}_i + \hat{\Psi} \right) \ w_i.$$

Since $\hat{\lambda}_i$, $\hat{\Psi} > 0$, it is clear that the factor is underused by the usual Pareto standard, but the Kuhn-Tucker conditions provide no theoretical reasons to suppose that Soviet enterprises are either inherently technically or economically inefficient, assuming quota restrictions are designed to optimize planners' preferences. Similarly, if factor j is used (8) enables us to write:

$$(8a) \quad p \, \frac{\partial x}{\partial v_j} = \left(1 + \hat{\Psi}\right) w_j,$$

and to conclude that these factors are also underused by the Pareto criterion[3].

Moreover, it should be noted that the behavioral dissimilarity between output and revenue maximization on one hand and profit maximizing on the other can be diminished, and even eliminated entirely if the restrictions on quota and non-quota inputs are appropriately set.

6. Multi-Product Soviet Firms with an Assortment Constraint

We now turn to the case of the multi-product Soviet firm (Pfouts, 1961). In doing this we assume that firm has a specific amount of fixed factors of production. The amount of a fixed factor that is used cannot exceed the total available to the firm in the short-run. Thus if z_{jr} is the amount of fixed factor r used in producing product j and Z_r is the total amount of the fixed factor available to the firm, it must be true that $\sum_{j=1}^{m} z_{jr} - Z_r \leq 0$. In addition when units of a fixed factor are put into a new use, there are start-up costs that will be incurred by the firm. Machines must be adjusted or calibrated when they are to be used, storage spaces must be cleaned etc. These costs are shown by

$$K\left(z_{j1}, \, ..., \, z_{mg}\right),$$

which is convex and has positive first derivatives.

Under the conditions of the multi-product firm the production function is shown as

$$x_j = f_j\left(v_{j1}, \, ..., \, v_{jn}, \, z_{j1}, \, ..., \, z_{jq}\right), \quad \forall_{j=1}^{m}.$$

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[3] Inputs may be underutilized, but not overemployed by the Paretian standard in the profit maximizing Soviet firm.

Here x_j is the quantity of product j produced, while v_{ji} is the amount of variable factor i used in producing product j and z_{jr} is the amount of fixed factor r used in the production of j. The production function of each product is strictly concave.

For the purpose of simplifying the notation we assume that there are no quota factors.

Because of the multi-product nature of the firm, the planning authorities can require that a particular assortment of products be produced. That is, they can require that a minimum amount of each product be produced. If an assortment requirement is imposed, the profit maximizing Lagrangian is

(11)
$$\hat{L} = \sum_{j=1}^{m} p_j \, x_j - \sum_{j=1}^{m} \sum_{i=1}^{n} w_i \, v_{ji} - K\left(z_{11}, \, ..., \, z_{mq}\right)$$
$$- F - \sum_{j=1}^{m} \tilde{\theta}_j \left(\overline{x}_j - f_j\left(v_{i1}, \, ..., \, v_{in}, \, z_{j1}, \, ..., \, z_{jq}\right)\right)$$
$$- \sum_{r=1}^{q} \tilde{\mu}_r \left(\sum_{j=1}^{m} z_{jr} - Z_r\right) - \tilde{\Psi} \left(\sum_{j=1}^{m} \sum_{i=1}^{n} w_i \, v_{ji} + K\left(z_{11}, \, ..., \, z_{mq}\right) - M\right).$$

The assortment constraints show x_j as the minimum amount required and thus can be written as

$$\overline{x}_j - f_j\left(v_{j1}, \, ..., \, v_{jn}, \, z_{j1}, \, ..., \, z_{jq}\right) \leq 0.$$

The Kuhn-Tucker conditions are

(12)
$$\frac{\partial \tilde{L}}{\partial \, v_{ji}} = p_j \, \frac{\partial \, f_i}{\partial \, v_{ji}} - w_i + \tilde{\theta}_j \, \frac{\partial \, f_j}{\partial \, v_{ji}} - \tilde{\Psi} \, w_i \leq 0, \quad \forall_{j=1, i=1}^{m \, n},$$

(13)
$$\frac{\partial \tilde{L}}{\partial \, z_{jr}} = p_j \, \frac{\partial \, f_j}{\partial \, z_{jr}} - \frac{\partial \, K}{\partial \, z_{jr}} + \tilde{\theta}_j \, \frac{\partial \, f_j}{\partial \, z_{jr}} - \tilde{\mu}_r - \tilde{\Psi}_r \, \frac{\partial \, K}{\partial \, z_{jr}} \leq 0, \quad \forall_{j=1, i=1}^{m \, n},$$

(14)
$$\frac{\partial \tilde{L}}{\partial \, \tilde{\theta}_j} = f_j\left(v_{j1}, \, ..., \, v_{jn}, \, z_{j1}, \, ..., \, z_{jq}\right) - \overline{x}_j \geq 0, \quad \forall_{j=1}^{m},$$

$$(15)\frac{\partial \tilde{L}}{\partial \tilde{\mu}_r} = Z_r - \sum_{j}^{m} z_{jn} \geq 0, \quad \forall_{r=1}^q,$$

$$(16)\frac{\partial \tilde{L}}{\partial \tilde{\psi}} = M - \left(\sum_{k=1}^{m} \sum_{i=1}^{n} w_i \ v_{ji} + K\left(z_{11}, \ ..., \ z_{mq}\right) \right) \geq 0.$$

An assortment constraint is binding if the quantity of the product required by unconstrained profit maximizing is less than the amount required in the assortment. In this case $r_j > 0$ and (12) can be shown as

$$(12a)\left(p_j + \tilde{\theta}_j\right) \frac{\partial \ f_j}{\partial \ v_{ji}} = \left(1 + \tilde{\psi}\right) \ w_i, \quad \forall_{i,j},$$

Similarly (13) may be written as

$$(13a)\left(p_j + \tilde{\theta}_j\right) \frac{\partial \ f_j}{\partial \ z_{jr}} = \left(1 + \tilde{\psi}\right) \frac{\partial \ K}{\partial \ z_{jr}} + \tilde{\mu}_r, \quad \forall_{j,r},$$

if the assortment constraint is binding on good j. Thus the rule for dividing fixed factors among different products differs from the Pareto rule.

Of course, as before, it can be argued that legitimate social goals may require a minimum output of goods or of some goods that would be greater than the output provided by profit maximization at established parametric prices.

The case in which the manager is instructed to maximize output in the multi-product firm cannot be analyzed until some rule for combining the different products into a composite whole is given because we cannot judge whether one output bundle is larger than another without specifying a rule of combination.

The total value of the outputs of the various products is one such rule of combination. Thus we consider the multi-product firm, with an assortment constraint and an instruction to maximize the total value of output or total revenue. In this case the Lagrangian is

$$\dot{L} = \sum_{j=1}^{m} p_j \ x_j - \sum_{j=1}^{m} \dot{\theta}_j \left(\overline{x}_j - f_j \left(v_{j1}, \ ..., \ v_{jn}, \ z_{ji}, \ ..., \ z_{jq}\right)\right)$$

$$- \sum_{r=1}^{q} \dot{\mu}_r \left(\sum_{j=1}^{m} z_{jr} - z_r\right) - \dot{\psi} \left(\sum_{j=1}^{m} \sum_{i=1}^{n} w_i \ v_{ji} + K\left(z_{11}, \ ..., \ z_{mq}\right) - M\right),$$

and the Kuhn–Tucker conditions are

$$(17)\frac{\partial \dot{L}}{\partial v_{ji}} = p_j \frac{\partial f_j}{\partial v_{ji}} + \dot{\theta} \frac{\partial f_j}{\partial v_{ji}} - \dot{\psi} w_i \leq 0, \quad \forall_{j=1,i=1}^{m\ n},$$

$$(18)\frac{\partial \dot{L}}{\partial z_{jr}} = p_j \frac{\partial f_j}{\partial z_{jr}} + \dot{\theta} \frac{\partial f_j}{\partial z_{jr}} - \dot{\mu} - \dot{\psi} \frac{\partial K}{\partial z_{jr}} \leq 0, \quad \forall_{j=1,r=1}^{m\ q},$$

$$(19)\frac{\partial \dot{L}}{\partial \dot{\theta}_j} = f_j \left(v_{j1}, ..., v_{jn}, z_{j1}, ..., z_{jq}\right) - \bar{x}_j \geq 0, \quad \forall_{j=1}^{m},$$

$$(20)\frac{\partial \dot{L}}{\partial \dot{\mu}} = Z_r \sum_{j=1}^{m} z_{jr} \geq 0, \quad \forall_{r=1}^{q}$$

$$(21)\frac{\partial \dot{L}}{\partial \dot{\psi}} = M - \left(\sum_{j=1}^{m} \sum_{i=1}^{n} w_i v_{ji} + K\left(z_{11}, ..., z_{mq}\right) \right) \geq 0.$$

For a product whose output is affected by the assortment constraint, (17) may be shown as

$$(17a)\frac{\partial f_j}{\partial v_{ji}} \left(p_j + \dot{\theta}_j\right) = \dot{\psi} w_i,$$

if v_{ji} is used. Production must be taken to the point where the marginal product of the variable factors becomes zero if the budget constraint is non-binding since $\dot{\psi} = 0$ in this case. (If the assortment constraint is also not binding for this output, $\dot{\theta}_j = 0$ and the marginal product again must be zero.)

As a final case we consider the possibility that the manager is free to maximize his bonus subject to an assortment constraint, and without regard to product prices. We assume that the bonus is given by

$$B^{\bullet} = \sum_{j=1}^{m} \beta_j^{\bullet} \left(x_j - \breve{x}_j\right), \text{where } \beta_j^{\bullet} = 0,$$

if $x_j < \breve{x}_j$ and is a positive constant otherwise. The Lagrangian can be written as

$$
L^* = \sum_{j=1}^{m} \beta_j^* \left(f_j \left(v_{j1}, \, \ldots, \, v_{jn}, \, z_{j1}, \, \ldots, \, z_{jq} \right) - \breve{x}_j \right)
$$

$$
- \sum_{j=1}^{m} \theta_j^* \left(x_j^* - f_j \left(v_{j1}, \, \ldots, \, v_{jn}, \, z_{j1}, \, \ldots, \, z_{jq} \right) \right)
$$

$$
- \sum_{r=1}^{q} \mu_r^* \left(\sum_{j=1}^{m} z_{jr} - Z_r \right) - \psi^* \left(\sum_{j=1}^{m} \sum_{i=1}^{n} w_i \, v_{ji} + K \left(z_{11}, \, \ldots, \, z_{mq} \right) - M \right).
$$

Here x_j^* in the first group of constraints is either the assortment requirement $\overline{x}_j$ or minimum bonus requirement $\breve{x}_j$ whichever is larger. That is, either the assortment constraint or the bonus condition will be effective for each good. The firm manager will regard the quantity required by the assortment constraint as the minimum to be produced if it is larger than the quantity specified in the bonus. But if $\breve{x}_j > \overline{x}_j$, then he will regard $\breve{x}_j$ as the minimum that he should produce, if it can be attained when $\psi^* > 0$.

The Kuhn–Tucker conditions are

$$
(22) \frac{\partial L^*}{\partial v_{ji}} = \beta_j^* \frac{\partial f_j}{\partial v_{ji}} + \theta_j^* \frac{\partial f_j}{\partial v_{ji}} - \psi^* \, w_i \leq 0, \quad \forall_{j=1, i=1}^{m \; n},
$$

$$
(23) \frac{\partial L^*}{\partial z_{jr}} = \beta_j^* \frac{\partial f_j}{\partial z_{jr}} + \theta_j^* \frac{\partial f_j}{\partial z_{jr}} - \mu_r^* - \psi^* \frac{\partial K}{\partial z_{jr}} \leq 0, \quad \forall_{j=1, i=1}^{m \; n},
$$

$$
(24) \frac{\partial L^*}{\partial \theta_j^*} = f_j \left(v_{j1}, \, \ldots, \, v_{jn}, \, z_{jn}, \, z_{j1}, \, \ldots, \, z_{jq} \right) - x_j^* \geq 0, \quad \forall_{j=1}^{m},
$$

$$
(25) \frac{\partial L^*}{\partial \mu_r^*} = Z_r - \sum_{j=1}^{m} z_{jr} \geq 0, \quad \forall_{r=1}^{q}.
$$

$$
(26) \frac{\partial L^*}{\partial \psi^*} = M - \left(\sum_{j=1}^{m} \sum_{i=1}^{n} w_j \, v_{ji} - K \left(z_{11}, \, \ldots, \, z_{mq} \right) \right) \geq 0.
$$

Once again it may readily be seen that (22) requires a departure from the Pareto conditions.

7. Production Frontiers, Technical Efficiency and Full Employment

The finding that Soviet enterprises satisfy Kuhn-Tucker conditions in the single and multiproduct cases regardless of whether managerial bonuses are linked to output, revenue or profit indicates that these enterprises should operate on their perceived production frontiers. Strictly speaking this is all that can be inferred because the relationship of the technically efficient enterprise production frontier to the optimal economic frontier (given planners' preferences) will depend on the regulatory efficiency of the system[9]. Nonetheless, it is easily seen from equations (4) and (6), in the absence of a centrally imposed budget constraint on non-quota goods, that output and revenue maximization promote overfull capacity utilization, and that a similar result will obtain if established product and input prices generate excess profits. These tendencies, together with the elimination of market risk achieved through guaranteed State purchase, may well explain the widely noted absence of involuntary unemployment in the Soviet Union (Rosefielde, 1986). Although enterprises may not overfully utilize plant capacity to the extent suggested by Kuhn-Tucker conditions due to the "ratchet" effect, and related types of bargaining behavior (Granick, 1980; Keren, Miller and Thornton, 1983), managers generally are rewarded rather than penalized for the overemployment of capital and labor, and for overproduction[9].

The formal satisfaction of the Kuhn-Tucker condition together with the rational adjustment behavior exhibited by Soviet firms constitute necessary, but not sufficient conditions for technical efficiency. Plan-directives, rules, signals and incentives may not always provide comprehensive guidance, or exert complete control over managerial behavior. The most interesting example of the first type of malfunction arises when bonus rewards are only activated after some threshold level of production is achieved. Managers who discover that they cannot reach the threshold, for reasons that might well be beyond their control, could theoretically choose to effort-minimize, although other informal rules may affect their actions. A similar, but conceptually different malfunction may occur at the other end of the production spectrum. Enterprise managers may terminate production before the Kuhn-Tucker conditions are satisfied because the funds used to pay bonuses are prematurely exhausted. In this instance, the malfunction is not intrinsic to the plan-directives, rules and incentive formulas governing optimization, but to a facilitating condition required for their implementation. Kuhn-Tucker conditions may also be violated because bonus rewards are too small to induce compliance. Soviet managers have no property rights and therefore cannot be expected to exert themselves for the benefit of the state without receiving what they deem to be adequate compensation (Domar, 1974; Bergson, 1978a; 1978b; Ireland and Law, 1980). Kuhn-Tucker conditions might also be irrelevant if constraints are dysfunctionally designed. Finally, enterprise optimization may be thwarted by fraudulent statistical practices, bureaucratic encumbrances and corrupt

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[4] Achievement of the true production possibility frontier requires that factors be optimally allocated across enterprises; a condition which is apt to be unfulfilled in the Soviet Union.

[9] The "ratchet" effect insofar as it exists in an economic, not a technical inefficiency because it is determined by the incentive structure imposed on the enterprise by the central authorities.

activities that permit managers to operate their enterprises for their private interest instead of subordinating themselves to the interests of the State (Shlapentokh and Kantorovich, 1985).

8. The Administrative Control System

These lapses notwithstanding, it seems clear in retrospect that khozraschyot was a seminal innovation which held out the possibility that a command economy predicated on technically efficient production tasking might enable the Soviet Union to compete with western market capitalism without resorting to Stalinist coercion, or indulging in the pipedream of computopia. The viability of the directive system hinged on a few administrative issues.
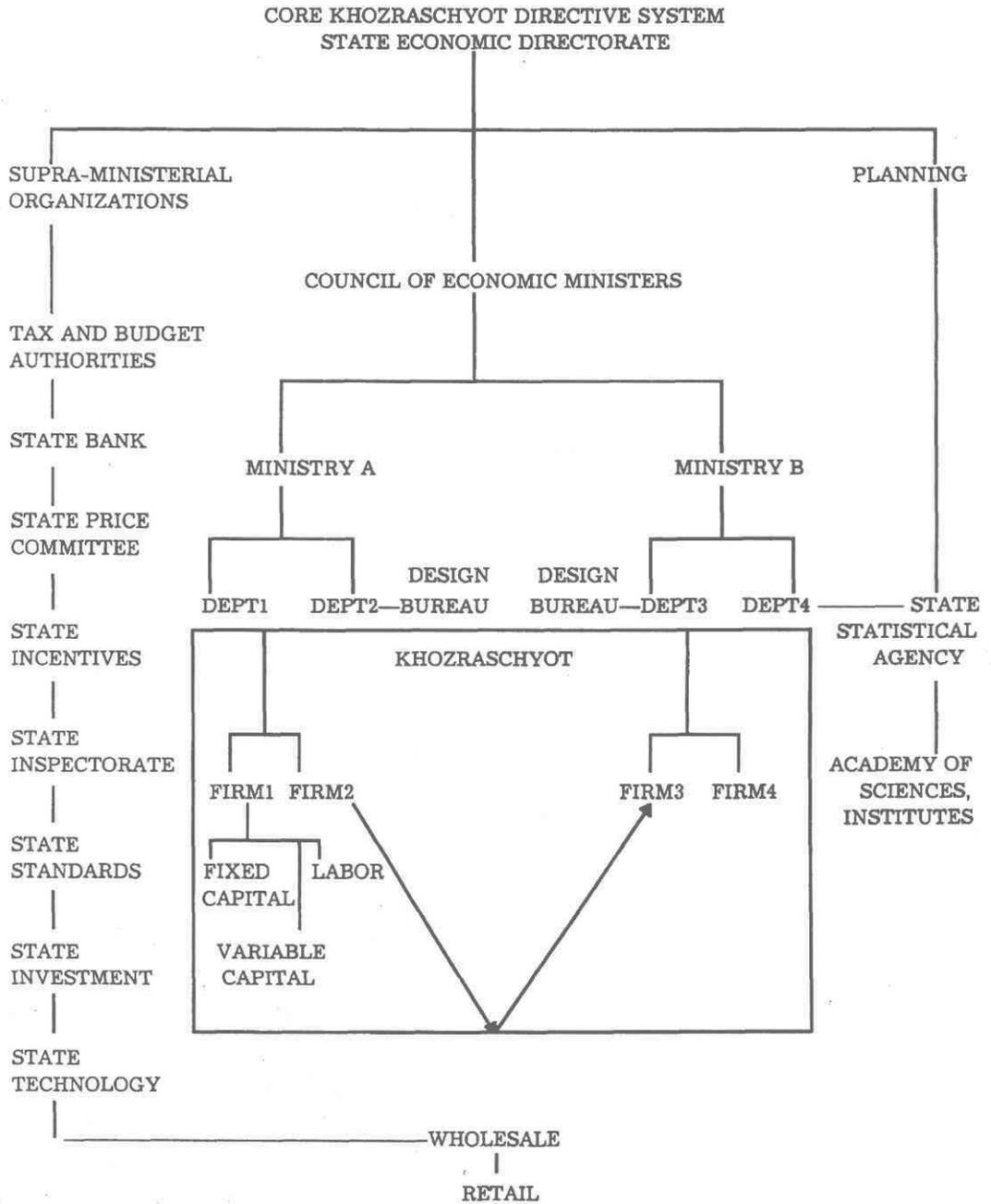
The state had to create a mechanism for harnessing science and technology that rivaled western private entrepreneurship using some combination of expert tasking and managerial incentivization. It had to embody this knowledge in the designs governing the characteristics of new capital durables and consumer goods. It had to fix factor and product prices, together with bonus incentives, input constraints and output quotas so that outcomes maximized the shadow value of production, given planners' preferences. It had to distribute output to final purchasers using rationing, retail pricing, taxes and subsidies to maximize the leaderships concept of social welfare. And last, but hardly least, it had to do all these things while deterring workers, managers and administrators from misusing and misappropriating state property.

This was a tall order. The task could be approached through centralized optimal microplanning, or decentralized networking known widely as the automatic system of management and planning (ASUP). If these comprehensive strategies failed, the efficiency benefits of khozraschyot could be expanded by permiting bonus maximizing among groups of firms organized as conglomerates and trusts, treating them as composite enterprises, while other entities improved themselves eclectically as their situations dictated.

The Soviets tried all these options using a control apparatus like the one sketched in Figure1.

The "State Economic Directorate," a fictious entity crowns the system. This body which theoretically supervises all aspects of administration has three components: supra-ministerial, ministerial and planning. Each branch has its own mission. The first is responsible for interministerial activities like price setting, product standards, tax collection, etc. The second, administers branch, and sectoral production, while the third is charged with aggregate planning, statistics and science policy. Each mission can be formulated as a bundle of tasks which ultimately provide enterprise or conglomerate directors with the information required to realize the full potential of the system, and maximize social welfare. But, as with all bureaucracies it is easier to elaborate missions and tasks than to identify whether they were best. Precisely because administrations are sheltered from market competition, they have no real knowledge of the demand for their services, or scarcity supply costs. As a consequence, while it is easily imagined that administrators could provide managers with the guidance they require to enhance

Figure 1.

CORE KHOZRASCHYOT DIRECTIVE SYSTEM
STATE ECONOMIC DIRECTORATE

SUPRA-MINISTERIAL
ORGANIZATIONS

PLANNING

COUNCIL OF ECONOMIC MINISTERS

TAX AND BUDGET
AUTHORITIES

STATE BANK

STATE PRICE
COMMITTEE

MINISTRY A   MINISTRY B

DESIGN   DESIGN
DEPT1   DEPT2—BUREAU   BUREAU—DEPT3   DEPT4 ——— STATE

STATE
INCENTIVES

KHOZRASCHYOT

STATISTICAL
AGENCY

STATE
INSPECTORATE

FIRM1   FIRM2   FIRM3   FIRM4

ACADEMY OF
SCIENCES,
INSTITUTES

STATE
STANDARDS

FIXED   LABOR
CAPITAL

STATE
INVESTMENT

VARIABLE
CAPITAL

STATE
TECHNOLOGY

————————————————WHOLESALE

RETAIL

aggregate productivity and economic welfare, in practice they are tilting at windmills with little realistic hope of systematic success.

The response of Soviet administrators to this predicament as inefficient, monopolistic suppliers of government (dis) services predictably was to empire build by overpromising new programs (including administrative reforms), while concentrating their attention on procedural matters and discipline. If the systems directors couldn't figure out what should be done constructively, they could at least define misconduct, and deter it by establishing comprehensive audit and enforcement procedures. Audit and discipline in this way became the hallmarks of the Soviet system. Enterprises had their books audited by state inspectors monthly. Managers were given very little petty cash and the revenues generated from product sales were credited directly to the firms' bank accounts, assuring that they were only disbursed for approved purposes. This didn't prevent misuse and misappropriation of state property, but greatly dampened abuse. Similar tactics were applied in mobilizing effort. Although administrators didn't know how to devise ideal incentives and constraints, they could and did strengthen enterprise discipline by increasing output quotas, tightening restrictions on input use and reducing the prices of new goods anticipating cost savings through learning.

These measures didn't enable the Soviet administrative system to achieve western standards of efficiency, productivity and welfare, but they did play an essential role in mobilizing resources and deterring corruption; complementing the technically efficient accomplishments of khozraschyot guided enterprise and conglomerate production. Directive tasking in these ways permitted the Soviet Union to produce a large, and growing supply of goods few wanted, together with full employment, price stability and a relatively egalitarian distribution of income. For many this was enough. But it wasn't prosperity and offered no hope that the east could ever catch up with and successfully rival the west.

9. Transition

Gorbachev and his successor Boris Yeltsin decided that the status quo was unacceptable; that Russia needed more than beggar communism. They recognized that parts of the old economic mechanism had to be scrapped, but didn't know which ones, or the best way to go about dismantling the system. Did they really desire to replace communism with capitalism, or did they prefer to incorporate markets selectively as components of directive tasking; a sort of khozraschyot with semi-private ownership and oligopolistic marketing?

Both approaches entailed political risks because major changes of any sort were apt to injure some, without immediately empowering a loyal constituency. Both also posed specific economic risks which were difficult to calibrate. The choice between them therefore depended primarily on their purported ideal characteristics. Capitalism promised a self regulating economic system characterized by consumer sovereignty, competition, private prosperity, and democratically responsive government services. Semi-marketized khozraschyot offered a directive alternative featuring the sovereignty of

the new state approved elite, managed competition, Russian-style private prosperity (whatever that might mean), and government services determined by the state leadership.

Gorbachev and Yeltsin conditioned by a millenium of Russian authoritarianism predictably chose the latter course, while paying lipservice to the former. Enterprises were only partly privatized, and state contracting continued to constitute a large share of aggregate effective demand. While Gosplan (the state planning agency) was formally dissolved, and ministerial authority pared, planning and ministerial oversight persisted. Likewise, although many enterprises were freed from the old bonus incentive schemes, with managers given the right to negotiate wages and prices, marketing their goods as they chose, new indirect controls were imposed through credit rationing, tax/subsidy policy and ubiquitous regulations. Most firms do not enjoy free market entry and exit, and have limited access to business information. Property rights remain tenuous and subject to revocation, with the result that many managers are more concerned with asset stripping, and revenue misappropriation than with maximizing shareholders' net worth.

The architecture of these new arrangements and their consequences can be illustrated with the assistance of the circular flow diagram.

Households and firms are arrayed from left to right along the horizontal axis, and the goods and resource markets are aligned north to south along the vertical axis. The government is displayed in two distinct capacities. First, at the vertex, it exerts directive control over some micro and all macroeconomic activities by producing some state services and delivering them directly to households, and by setting macroeconomic policy. Second, it administers and regulates resources and goods at all levels including household consumption and factor supply, firms input acquisition and goods production, and market exchange in both resources and goods. The term administer here means that the government prohibits and compels specific actions without permitting choice, whereas regulation allows households, firms and markets some latitude for constrained private optimization.

Administration is executed in the usual way through directives both to state officials (including managers of state controlled firms) and private individuals. Regulation is accomplished through rules, ordinances and selected wage and price fixing.

The impact of these pervasive governmental interventions in the private, semi-private and the old fashioned Soviet khozraschyot sectors depends how administration and regulation effect the responsiveness of supply to demand. If as is the case in the American economic system, the private sector is competitive, and government services are largely responsive to democratic preferences so that administration and regulation don't infringe consumer preferences with regard to input supply (including entrepreneurial activity), and the production and distribution of goods, then the circular flow embodies the principle of consumer sovereignty. Alternatively, if the private sector is anticompetitive reflecting the domination of state, kleptocratic and mafia elites, and governmental services are mostly responsive to their anti-democratic preferences, the circular flow will reflect the sovereignty of the ruling directive elites. This is vividly illustrated in the Russian case by the perverse structure of production and consumption. Wealth today stems from the control of exportable natural resources, and foreign trade services. Its concentration in the hands of a small elite has created a situation where

demand is primarily for foreign goods, with the result that non-natural resource oriented domestic industries are languishing together with the population that it supports, while the circular flow runs primary between elite controllers of natural resources and imported luxury goods.

Russia in effect has succeeded in creating a new authoritarian, market assisted, directive, khozraschyot economic system that suppresses production for everyman and institutionalizes the enrichment of a non-deserving elite.

This is hardly surprising, and was predicted by all discerning specialists including Emil Borisovich Ershov, Yuri Yaremenko, Alexander Smirnov and Georgii Kleiner as early as the late eighties. They understood that shock therapy was merely a pretext for institutionalizing the privatization of state revenues and assets to the vanguard of the proletariat (including the military industrial complex), and the criminal elite. This not only implied that the privileged would flourish, but also required the suppression of would be new entrants who might erode their power. The results are there for all objective observers to see. Russia is in the midst of a titanic deindustrialization, and inegalitarian redistribution of income with no sign of the long heralded revival. From the perspective of formal systems theory, this mischief can be easily undone. Institutions can be redesigned to sustain a well functioning, consumer sovereign, self-regulating market system, or even a more just variant of market assisted khozraschyot. But the constituencies for these reforms are moribund with little prospect of extirpating Russia's kleptocrats any time soon. The prognosis is for more of the same well into the next millenium.

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